

## Chapter 2 Linear Relations and Functions

## 2-1 Relations and Functions

Relation--set of ordered pairs

$$\{(1,2), (3,4), (5,6)\}$$

Domain--set of 1st coordinate

$$\{1, 3, 5\}$$

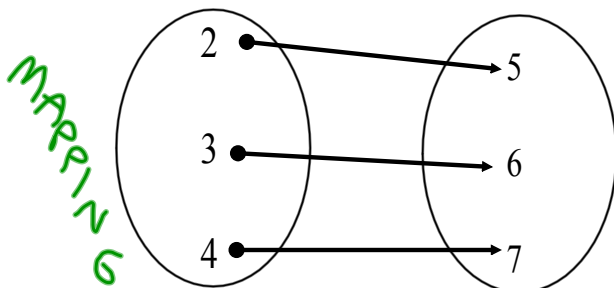
Range--set of 2nd coordinate

$$\{2, 4, 6\}$$

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Function--relation in which each element in the domain is paired with exactly one element in the range

$$\{(2,5), (3,6), (4,7)\}$$



A function because every  $x$  is paired with exactly one  $y$ .

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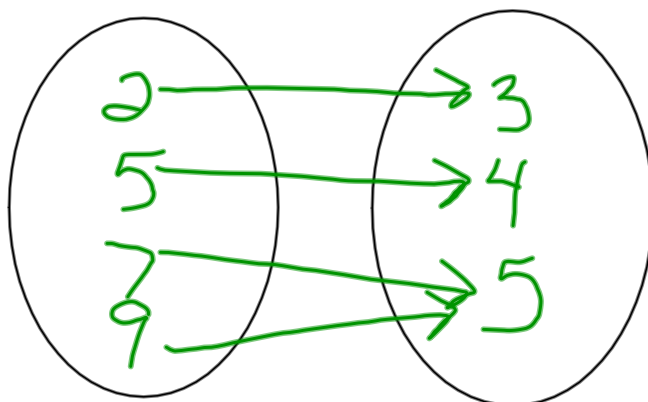
One-to-one--when every element in the range is paired with exactly one element in domain

(Every y has one x)

1 - 1

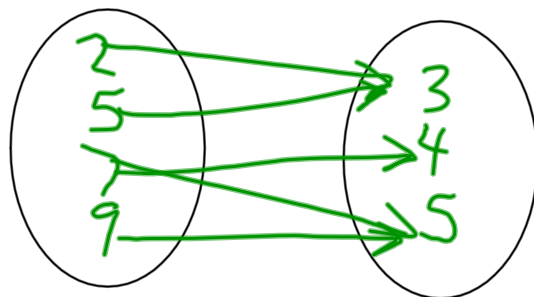
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$\{(2, 3), (5, 4), (7, 5), (9, 5)\}$

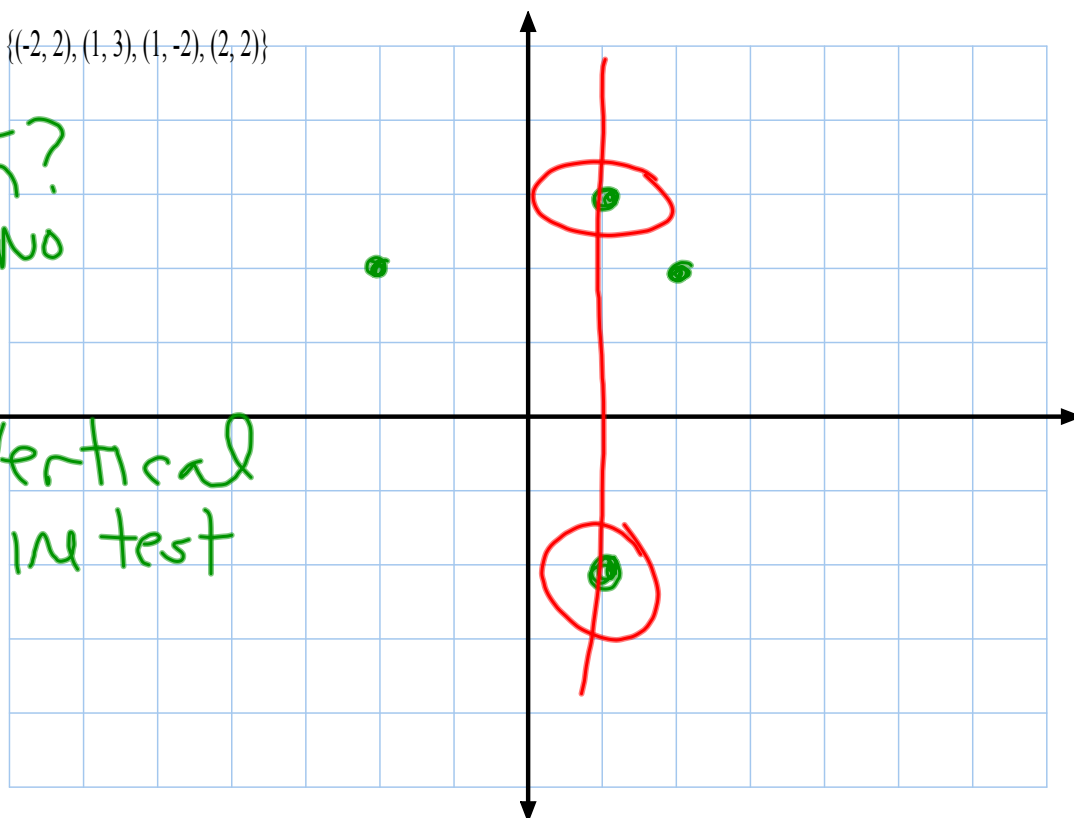


Fn.? yes  
1-1? no

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$\{(2,3), (5,3), (7,4), (7,5), (9,5)\}$  $F_n?$  No~~1+?~~

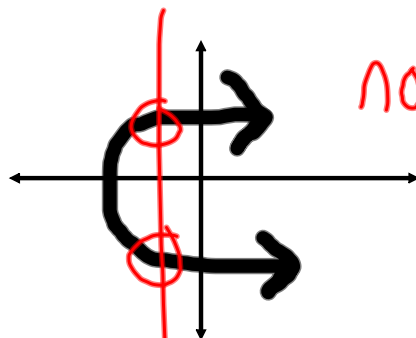
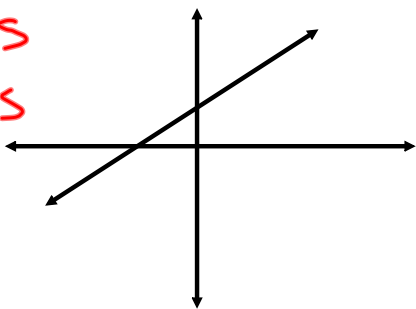
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 $\{(-2,2), (1,3), (1,-2), (2,2)\}$  $F_n?$   
NoVertical  
line test

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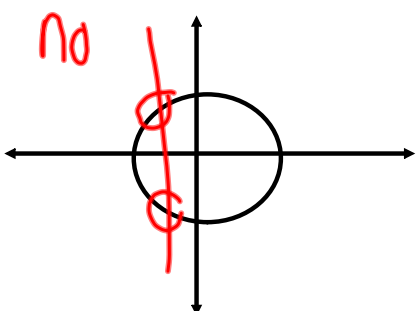
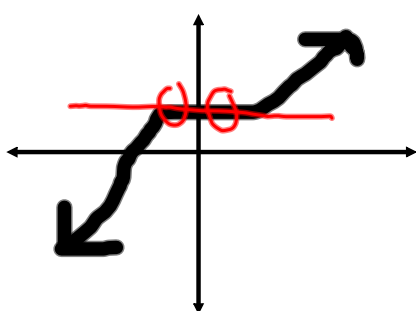
Is it a function?

yes  
yes



no

yes  
no



no

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$$x = y^2 + 1$$

x	y
5	-2
2	-1
1	0
2	1
5	2

Function?

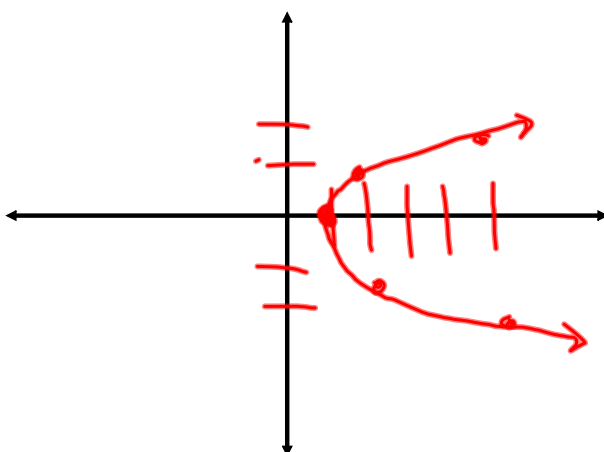
No

Domain

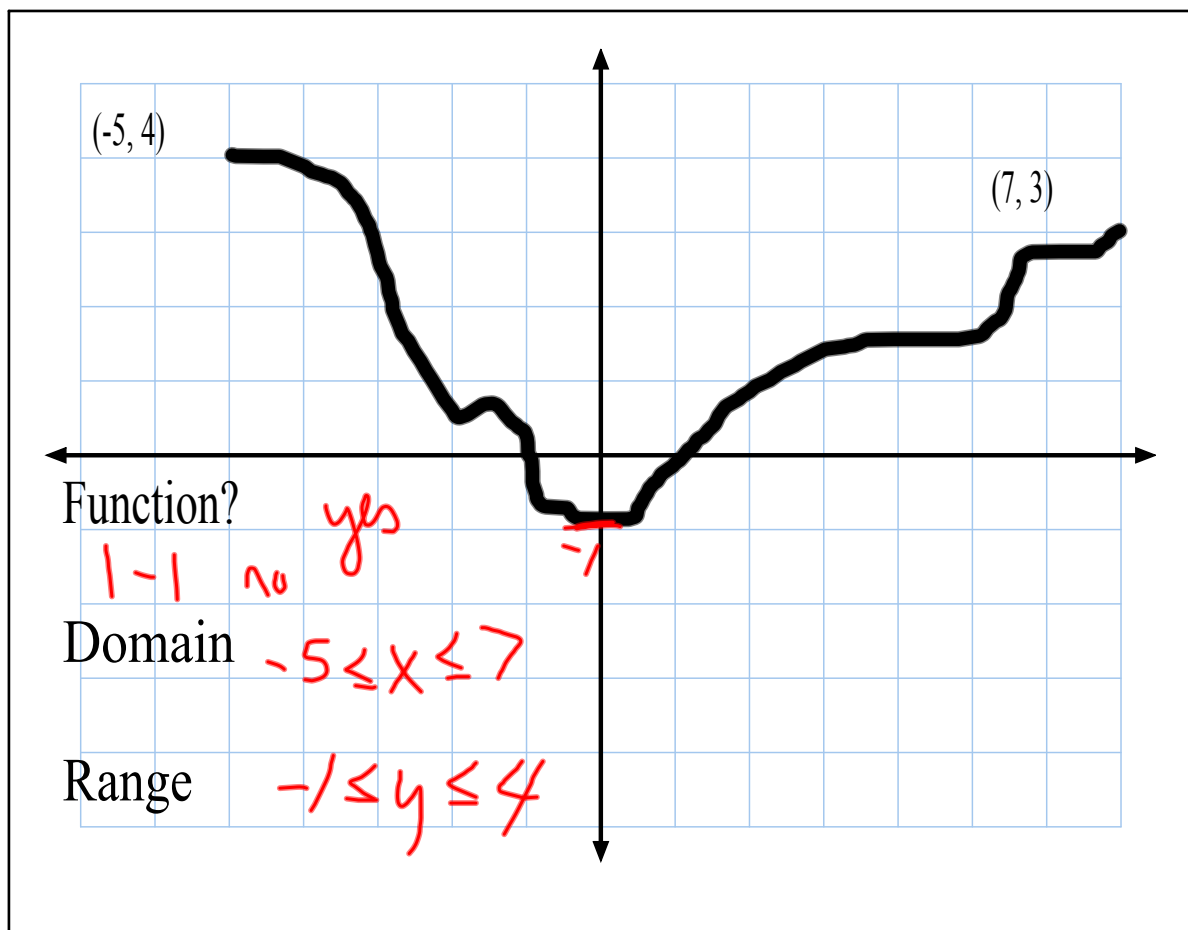
$x \geq 1$

Range

$\mathbb{R}$

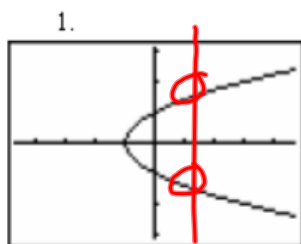


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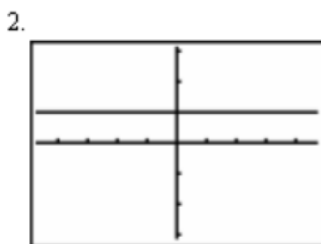


Worksheet

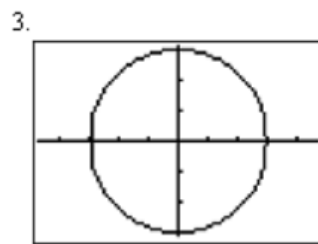
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a. No  
b. No  
D:  $x \geq -1$   
R:  $\mathbb{R}$

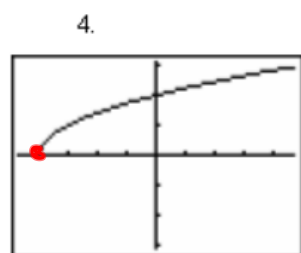


a. yes  
b. no  
D:  $\mathbb{R}$   
R:  $y = 1$

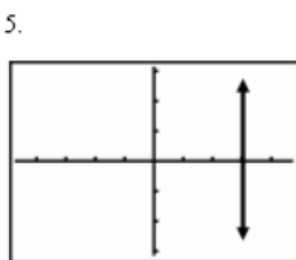


a: no  
b. no  
D:  $-3 \leq x \leq 3$   
R:  $-3 \leq y \leq 3$

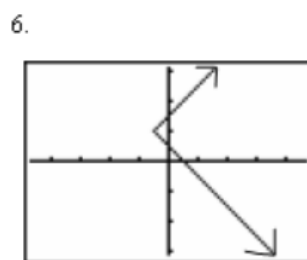
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yes  
yes  
D:  $x \geq -4$   
R:  $y \geq 0$

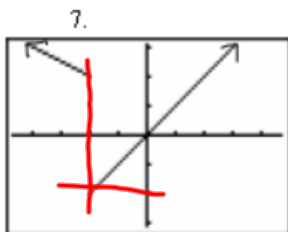


no  
no  
D:  $x = 3$   
R:  $\mathbb{R}$



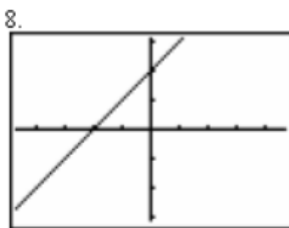
no  
no  
D:  $x \geq -\frac{1}{2}$   
R:  $\mathbb{R}$

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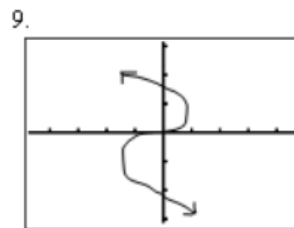
a. no

b. no

D:  $\mathbb{R}$ R:  $y \geq -2$ 

yes

yes

D:  $\mathbb{R}$ R:  $\mathbb{R}$ 

no

no

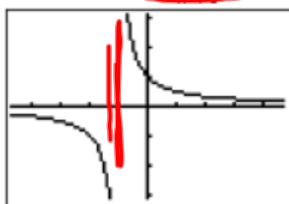
D:  $\mathbb{R}$ R:  $\mathbb{R}$ 

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10.

$$y = \frac{1}{x+1}$$

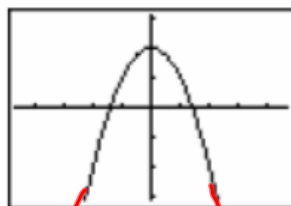


yes

yes

D:  $\mathbb{R}, x \neq -1$ R:  $\mathbb{R}, y \neq 0$ 

11.

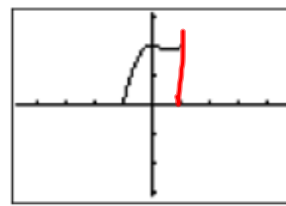


yes

no

D:  $\mathbb{R}$ R:  $y \leq 2$ 

12.



yes

no

D:  $-1 \leq x \leq 1$ R:  $0 \leq y \leq 2$ 

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## Function Notation

$$f(x) = 3x + 2$$

$$g(x) = x^2 - 2x$$

$$f(2) = 3(2) + 2$$

$$f(2) = 8$$

$$(x, f(x))$$

$$(2, 8)$$

$$g(3) = (3)^2 - 2(3)$$

$$g(3) = 3$$

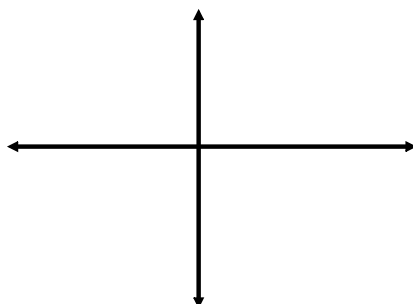
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Graph these:

$$f(x) = |x + 2|$$

Domain

Range



$$f(x) = \frac{1}{x-2}$$

$$x - 2 \neq 0$$

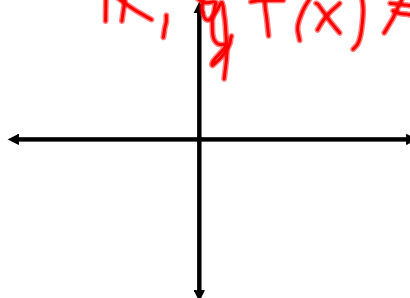
$$x \neq 2$$

Domain

$$\mathbb{R}, x \neq 2$$

Range

$$\mathbb{R}, y \neq 0$$



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Fuel Efficiency for light trucks

1995	20.5
1996	20.8
1997	20.6
1998	20.9
1999	20.5
2000	20.5

Function?

1-1?

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**HW**

p60-61

#s 4-6, 17-22, 23-33odd, 42-53

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